Results of June 23 Pbar Low-Beta Lattice Measurement

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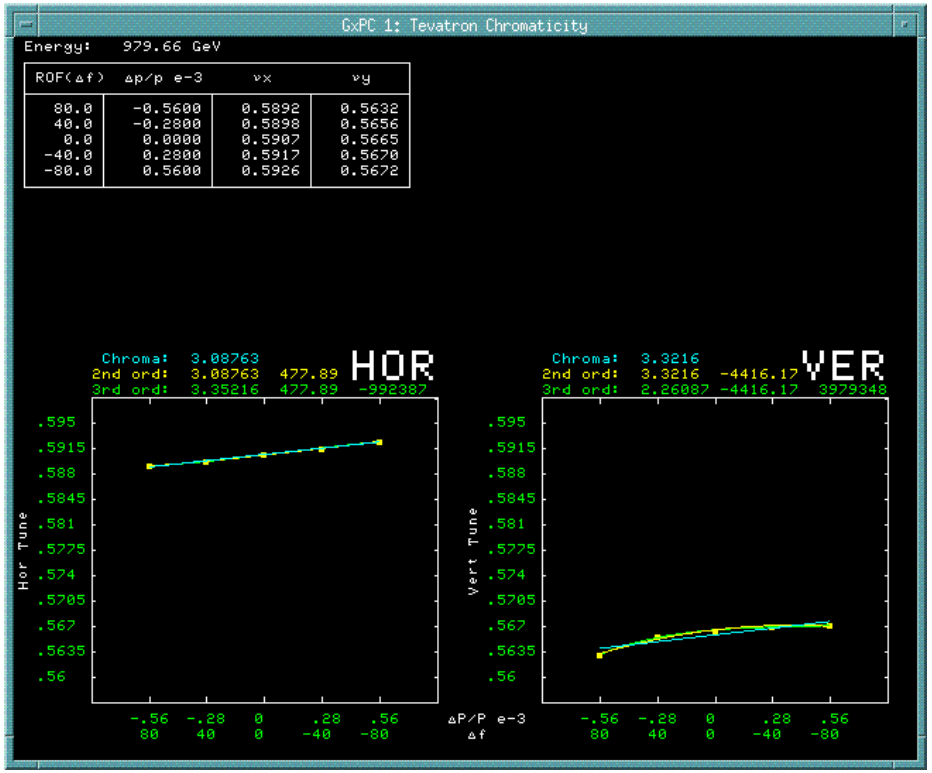
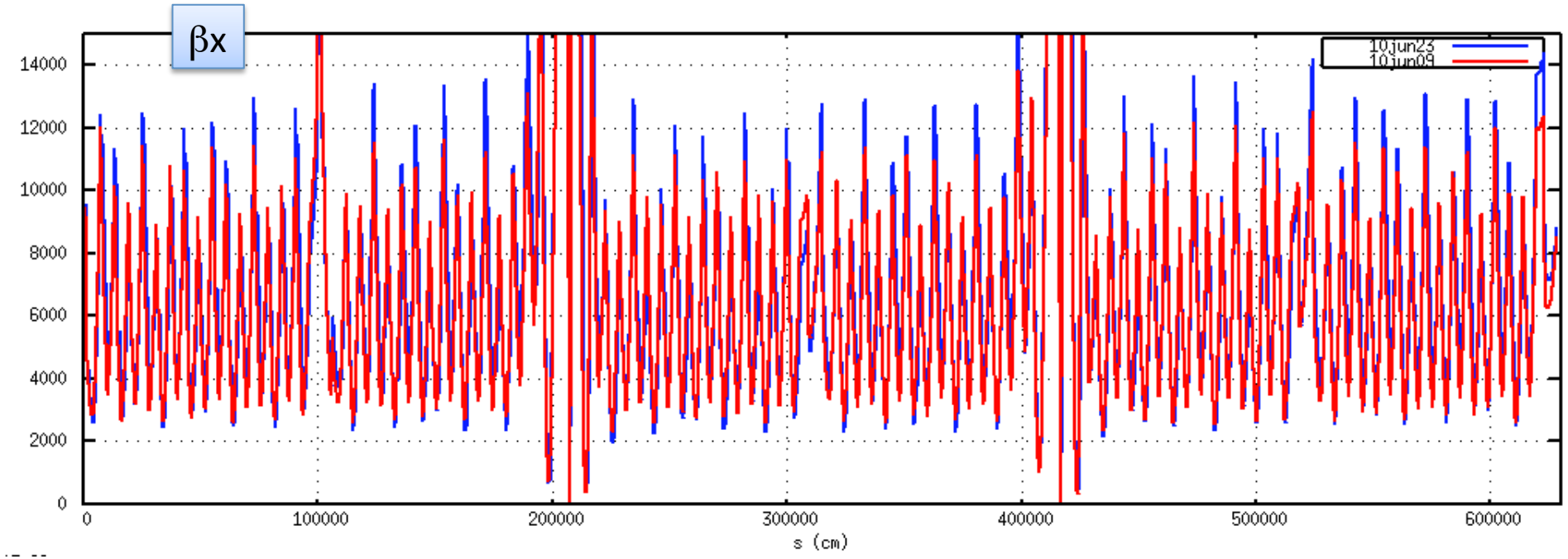
Some Notes

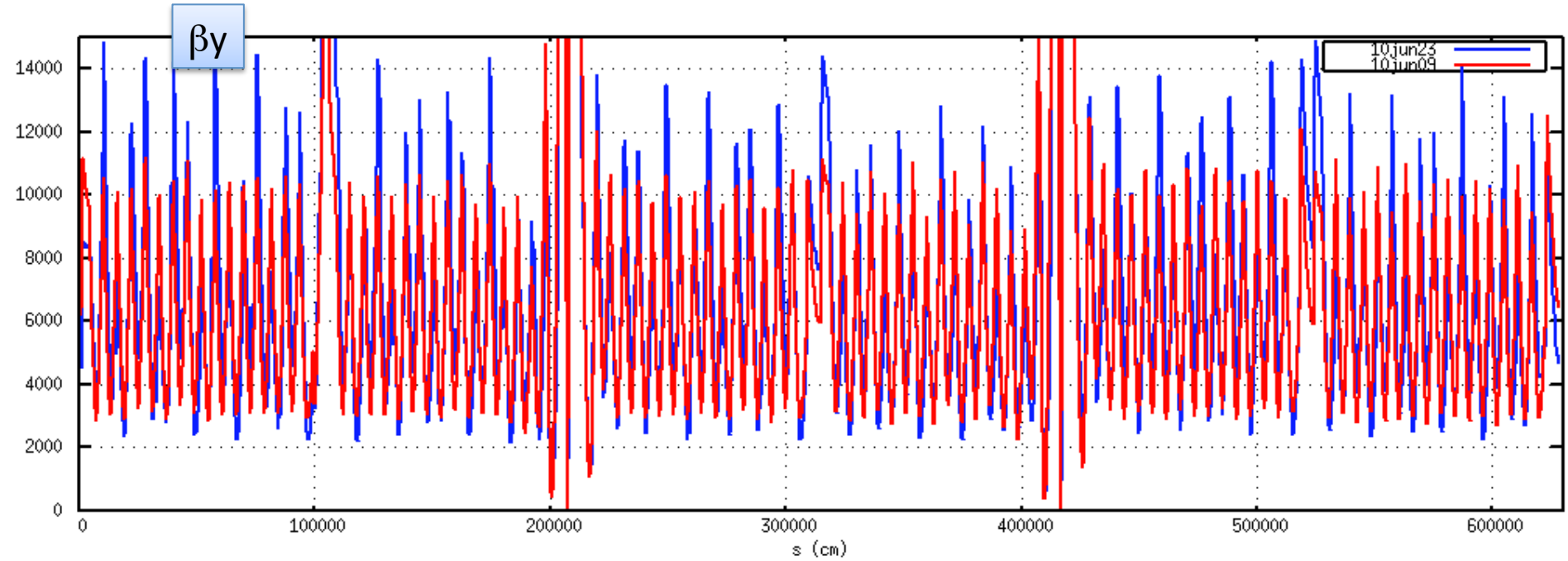
- Purpose of the measurement: pre-shutdown documenting of the machine and understanding of difference between proton and pbar optics
- This was the first successful lattice measurement with pbars on pbar helix
- Standard orbit response measurement with 60 correctors
- Final convergence of the fit is 20 μm (rms orbit error) which corresponds to 15% error in β-function
- Again had to spend time putting BPMs into correct mode

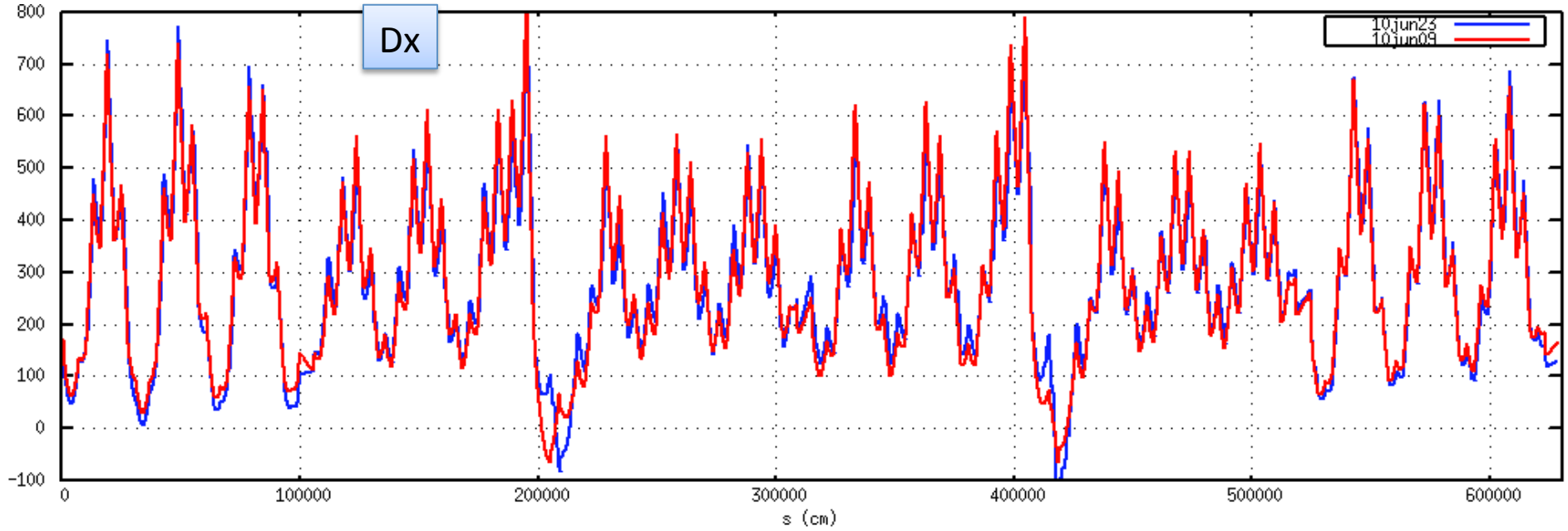
Tunes and Chromaticity

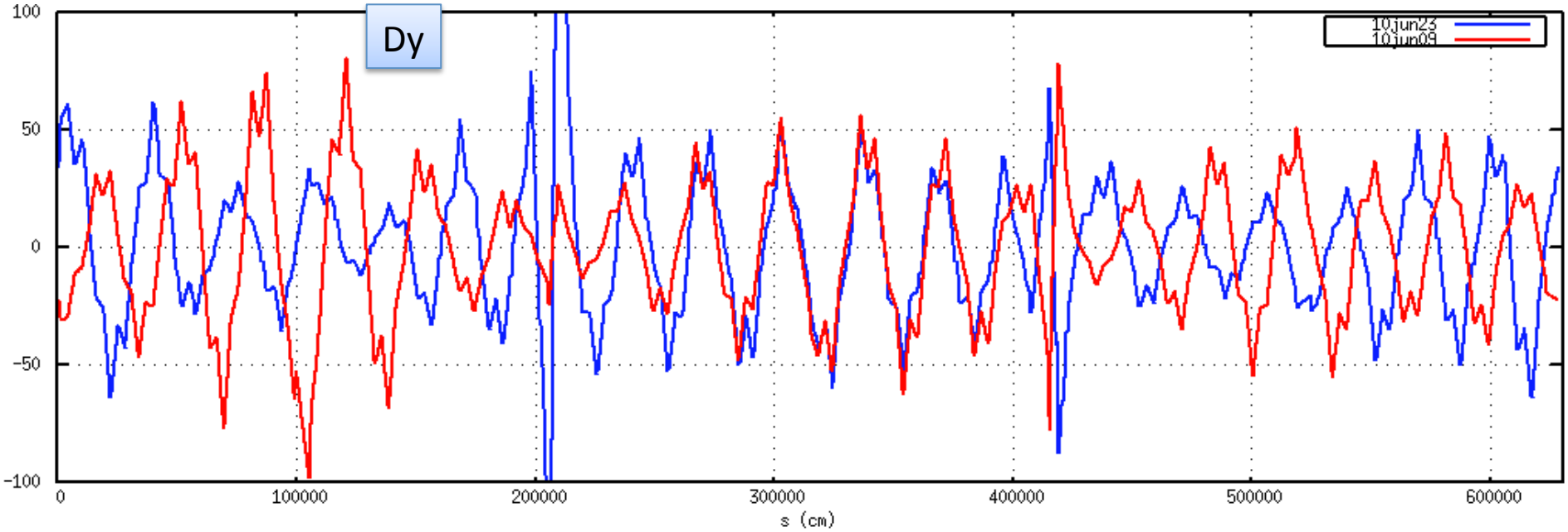
- Tunes on pbar helix: Qx=0.5727 Qy=0.5602 (ΔQ=0.0125)
- “True” tune settings: Qx=0.5688 Qy=0.5664
- Very low chromaticity: Ch=3 Cy=3




βx
10jun23
10jun09
14000
12000
10000
8000
6000
4000
2000
0
0
100000
200000
300000
400000
500000
600000
s (cm)


βy
10jun23
10jun09
14000
12000
10000
8000
6000
4000
2000
0
0
100000
200000
300000
400000
500000
600000
s (cm)


Dx
10jun23
10jun09
800
700
600
500
400
300
200
100
0
-100
0
100000
200000
300000
400000
500000
600000
s (cm)


Dy
10jun23
10jun09
100
50
0
-50
-100
0
100000
200000
300000
400000
500000
600000
s (cm)

β^* Summary Table

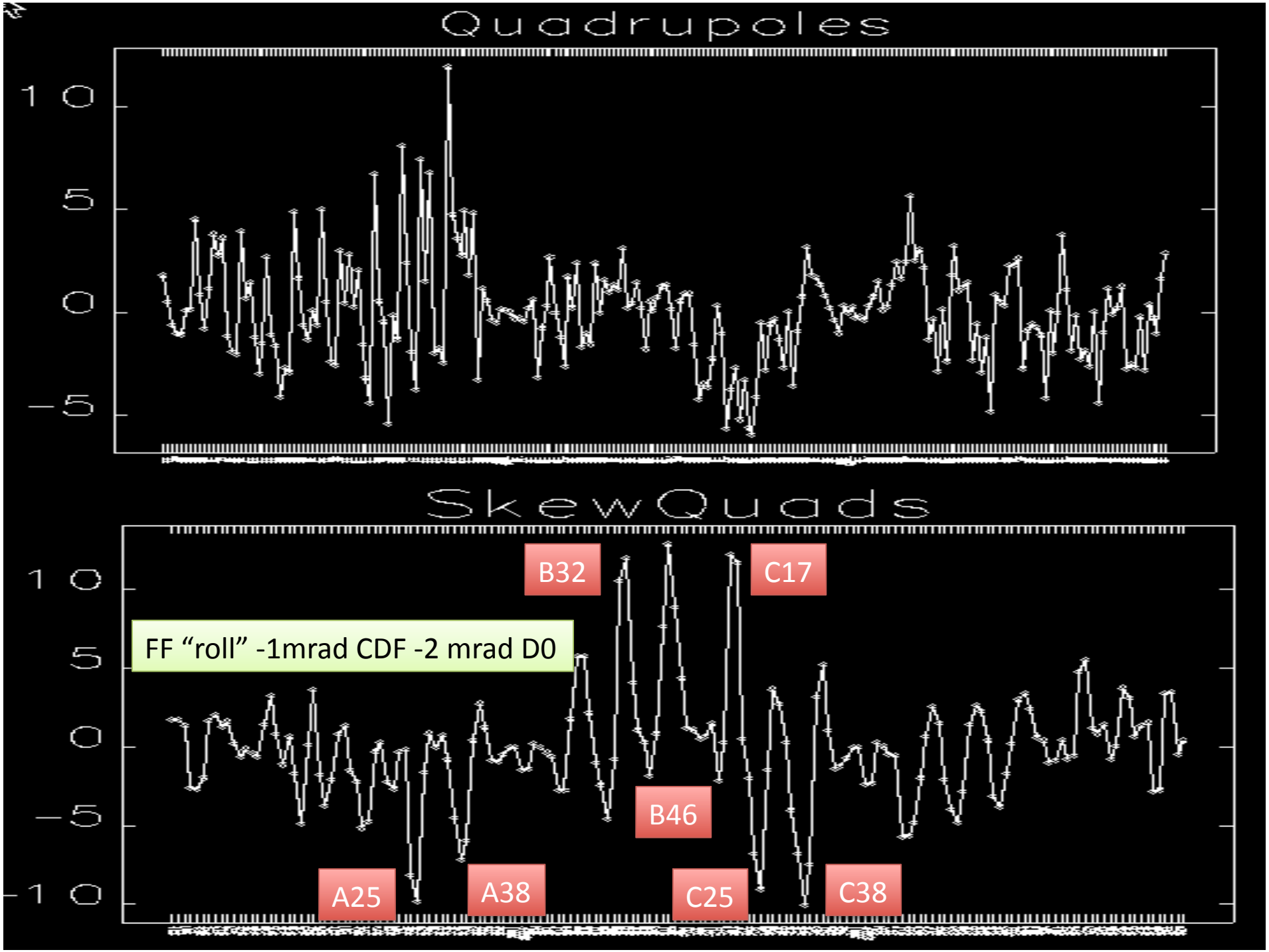
	β_x prot	β_y prot	β^*
CDF	29.7	29.7	29.7
D0	25.9	32.3	29.1

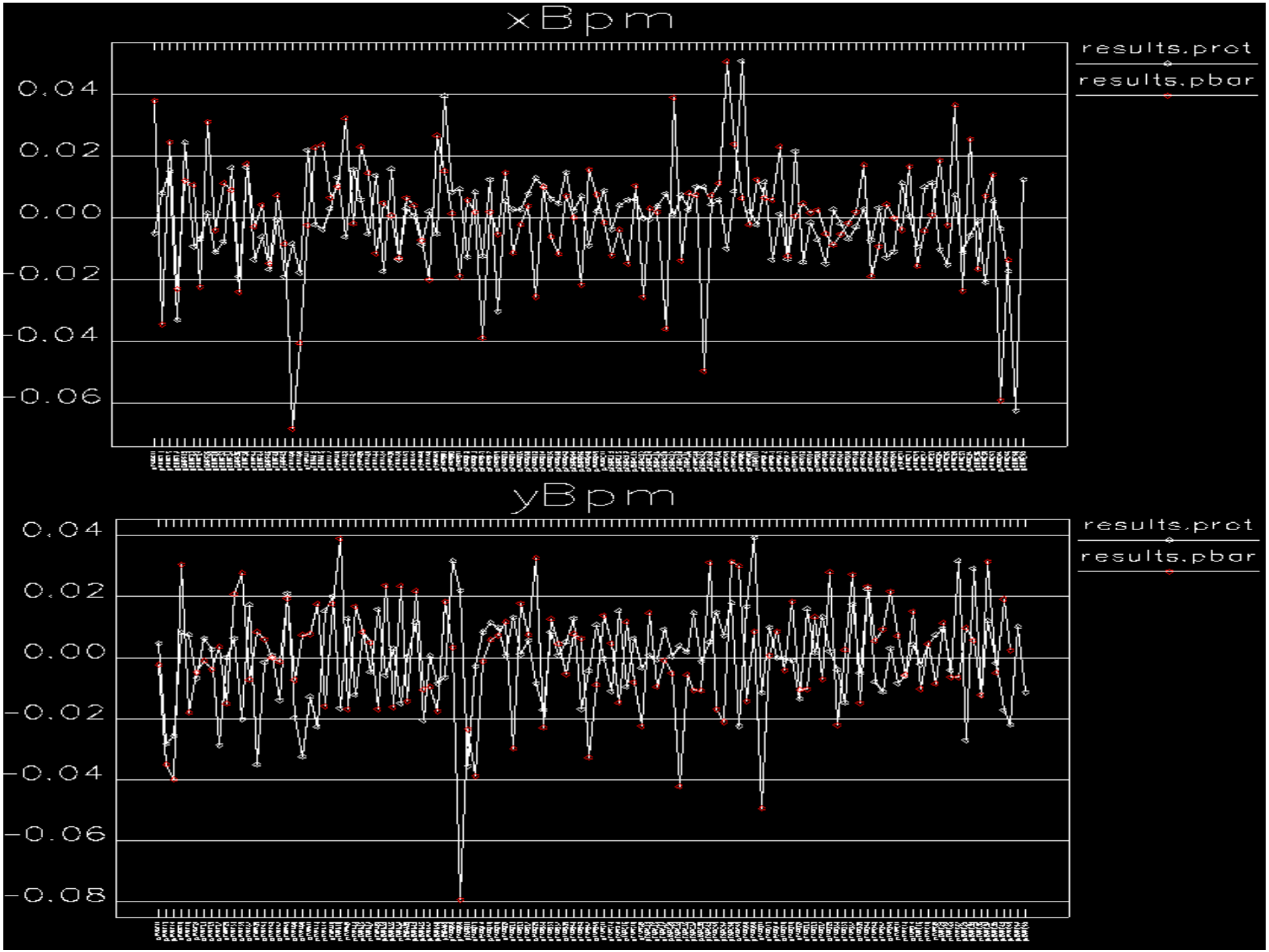
	β_x pbar	β_y pbar	β^*
CDF	26.1	44.0	35.0
D0	27.2	30.7	28.9

	D_x prot	D_y prot	D^*
CDF	1.0	0.8	1.3
D0	2.3	-1.1	2.5

	D_x pbar	D_y pbar	D^*
CDF	3.1	-0.2	3.1
D0	-0.3	-2.9	2.9

The method does not determine z*


Quadrupoles
10
5
0
−5
SkewQuads
10
5
0
−5
−10
FF “roll” -1mrad CDF -2 mrad D0
B32
C17
B46
A25
A38
C25
C38


xBpm
0.04
0.02
0.00
-0.02
-0.04
-0.06
results.prot
results.pbar
yBpm
0.04
0.02
0.00
-0.02
-0.04
-0.06
-0.08
results.prot
results.pbar

Summary

- Successfully measured pbar collision optics
- There is a significant beta-beating in the vertical plane
- Gradient errors are small, difference between prot and pbar lattice mostly in coupling: both at FF triplets and in the arcs.
- β^* values are not very different between proton and pbar orbits